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How to Make a Synthetic Diamond

By mrcrumley (/member/mrcrumley/) in Workshop (/workshop/) > Science (/workshop/science/projects/)

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About: (Is there a word that means more than "ultimate"? Oh well, I'l just make one up... "omnilent") Omnilently creative, MrCrumley fights a daily battle to save the world in his capacity as a multimedia superhero… More About mrcrumley » (/member/mrcrumley/)

My 10-year Wedding Anniversary is coming up so I thought I'd make my wife something special. A few months back I'd seen a show on TV where they demonstrated how companies were now making "cultured" diamonds in the lab. There are a few different methods, but the simplest is something called "chemical vapor distillation". The process is pretty straightforward. Basically, microwaves are used to create a slurry of graphite plasma which, when rapidly cooled form a crystal structure.

I checked around on the internet and found several sites where others have been doing the same thing. The best part was that everything I'd need were pretty common household items. So, I rounded up the necessary supplies and began imagining how great life would be once I'd cornered the international diamond market.

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Step 1: Materials

Here's the surprisingly short list of materials I used:

A standard home microwave oven
2 coffee mugs
3 pieces of 3mm graphite pencil lead
A few drops of extra virgin olive oil
A 5" piece of 100% cotton thread

The hardest item to find was the 100% cotton thread. It's amazing how scarce that stuff is. After searching through all of our sewing notions, I finally found some black thread that I think my mom bought back in the 70's.

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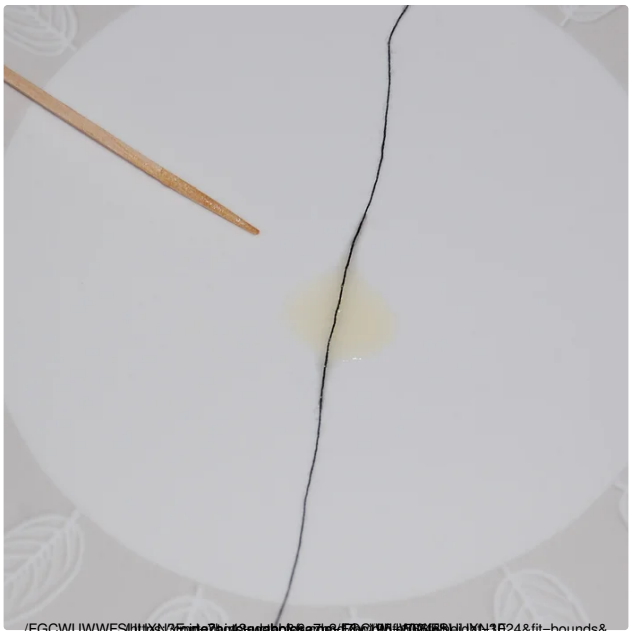
Step 2: Prepare the Olive Oil



As I mentioned above, the theory behind this project is using microwaves to heat the graphite into a plasma. In general, pencil graphite is not reactive enough to microwaves. So, a thin oil is used to

concentrate the heat in a specific area of the graphite. Also, as the oil heats up and begins to burn, it chemically separates the binder in the pencil lead from the graphite.

Place a few drops of olive oil onto a plate and lay the thread in the oil. The thread will absorb some of the oil.

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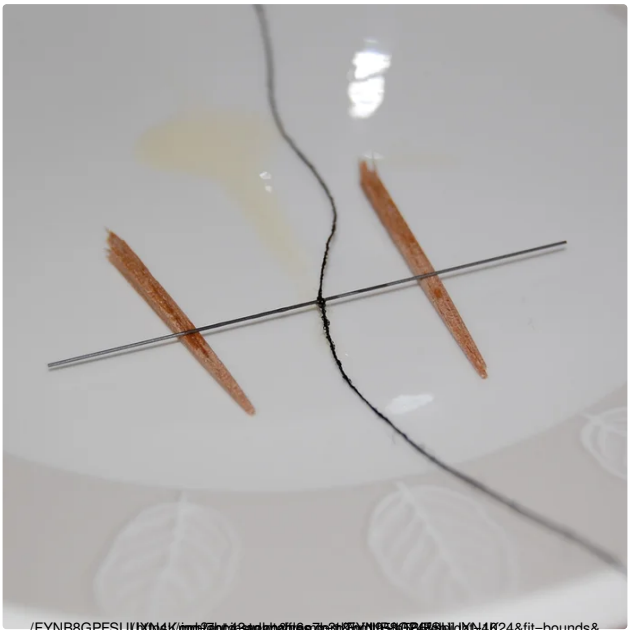
Step 3: Transfer Oil to the Graphite



Lift the oily thread and tie a knot in it.

Don't pull the knot all-the-way closed!

Carefully slip a piece of graphite through the knot loop and lay both the thread and graphite on a plate. I used two halves of a toothpick to keep the graphite suspended above the plate. This helps keep the oil confined to a single spot on the graphite.

Pull both ends of the thread until the knot has closed around the graphite.

Wait about 30 minutes for the oil to soak into the graphite.

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Step 4: Setup (i.e. Clean) the Microwave Oven

I didn't really tell my wife what I was up to. (It is, after all, a surprise.) But when she saw that it involved our microwave, her response was, "please don't burn the house down."

I assured her it wouldn't, and that I'd need to clean the microwave before my "experiment." This ended her objections.

So, while the oil was soaking into the graphite, I cleaned the microwave. The sites I'd read from others folks doing this insisted that a clean microwave would yield better results. Maybe, maybe not, but it sure looks better.

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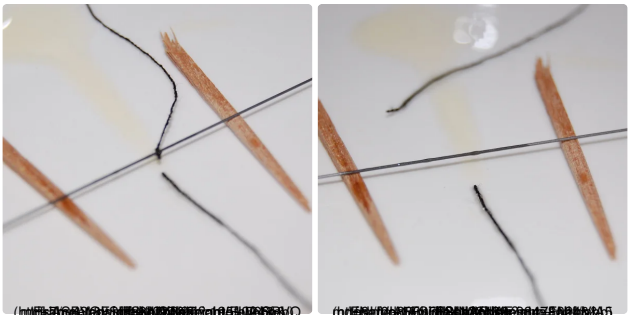
Step 5: Remove the Thread



Clip off part of the thread as close to graphite as possible. Then, gently tug on the other end of the thread and pull the knot undone.

Try not to slide the thread up-and-down the graphite. Remember, it's important to keep the oil concentrated in one spot.

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Step 6: Set the Graphite on the "Crucible"

Here's the ingenious part of the project. Turn one of the coffee mugs upside-down. (I used a slightly larger one as the base.)

Set 2 more pieces of graphite (non-oiled) on the upturned mug, parallel to each other.

Lay the oiled graphite across the other 2 pieces.

Place the other coffee mug over all of it.

Presto! It's a makeshift crucible!

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Step 7: Place "Crucible" in Microwave

Place the stacked mugs into the microwave. In my setup, the large bottom mug required that I remove the glass tray.

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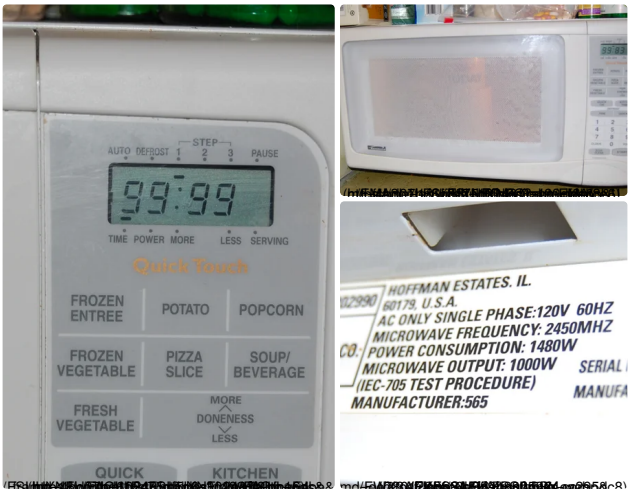
Step 8: Start the Microwave



Set the microwave for its maximum cook time at the maximum power setting. In my case, that was 99 minutes and 99 seconds - which turned out to be long enough.

Be advised: the microwave will spark a bit where the oil has soaked into the graphite. This is normal as the oil is bonding with the binder in the pencil lead. It should stop sparking after a few minutes.

After the microwave is done, let the mugs cool completely before removing them. Remember, if done correctly, you've generated 1,200+ degrees inside the crucible. Be safe.

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Step 9: Admire the Finished Product

After the mugs have completely cooled, remove them from the microwave.

The oiled graphite will be broken. The others should largely be intact. You'll also find a small lump, slightly larger than a grain of sand where the oiled section was placed.

Congratulations! This is the product of your labors, a genuine diamond.

I took the raw diamond to a jeweler I know and had her test it. She confirmed that underneath the scale material, there's a tiny bit of diamond material. She said that its quality was pretty poor, but it did fluoresce like a "real" diamond.

Now, admittedly, this homemade synthetic diamond is too small and too filled with inclusions to make into jewelry. But, it technically qualifies as a diamond... and I made it, so that's pretty cool.

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Step 10: Make It Into a Keepsake

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SUCH a disappointment!! this was a prank?!? I was going to do this for mothers day...

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i like how people legt thought you were about to make a actual diamond that is polished and cut lmfao

2

(/member/Cheathum14/) Cheathum14 (/member/Cheathum14/) 13 years ago on Step 9

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I don't like being "that guy" but it seems there are plenty of others on this site so im going to say it anyway; thats not a diamond. Here are a few reasons why.
1. The pencil lead you used contains a large amount of clay, not just graphite.
2. Microwaves are not capable of generating the heat neccesary to recrystalize carbon.
3. Even if the microwave could reach the neccessary temperature, the pressure required to make a diamond is around 50,000 to 70,000 times that of earth's atmosphere.
4. How is it that you claim to have made a diamond in your microwave if diamonds weren't even synthesized until 1953, six years after the first microwave oven was made? If they had the technology in 1947, why not use it then?

Sorry for pooping your party, but it looks like im not the only one.

17 replies

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